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ABSTRACT

Financing options for energy efficiency investments by colleges are outlined by the Energy Task Force of three higher education associations. It is suggested that alternative financing techniques generate a positive cash flow and allow campuses to implement conservation despite fiscal constraints. Since energy conservation saves money, the savings can be used to offset the cost of improvements. The following financing options are summarized: internal financing, building reserve and replacement funds, bond fund pools, shared savings, municipal leasing, third-party project financing, fund raising, tax-exempt bonds, commercial bank borrowing, and borrowing from endowment. Straight financing potentials for both public and private colleges are addressed. Attention is also directed to reevaluating capital budgeting, establishing internal policy, risk management, and integrating the capital program with operations and maintenance. The financial evaluation of efficiency investments is discussed, with attention to: simple payback period, net present value, return on investment, and cash-flow improvements. Important variables for the financial analysis are also discussed, including term of analysis, energy price escalation factor, base-year savings, and the cost of delay. Twelve energy financing self-assessment questions are also presented. (SW)

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Financial Planning for Energy Efficiency Investments

by the ENERGY TASK FORCE

Campus energy conservation is something of a fatherless child. Everyone involved, from physical plant managers to college and university presidents, believes in the merits of conservation, but few find all the resources and capital investment needed to attain the savings that energy efficiency promises. Government grants are only a partial step toward the funding of conservation, which has often had low priority in this period of increasingly tight budgets.

Many institutions—schools, hospitals, colleges and universities—possess significant potential energy savings that are going unrealized because of the lack of available capital. Between $1.25 and $3.00 per square foot of cost-effective energy improvements go unmade in the average institutional building in the United States, and investments in central plant modifications, such as fuel conversions and cogeneration installations, in the competition for limited resources many worthy projects are not getting funded. Project delay means losing potential savings and risking higher project costs.

Higher education spent over $3.5 billion on energy in the 1982–83 year, which was about 6 percent of the general educational budget, over $365 per full-time equivalent, and twice the amount spent on libraries. Energy conservation requires cost control and responsible fiscal management. The recent relaxation of oil prices does not mean that schools should relax their conservation efforts. In the short-term, prices should move downward or remain steady, but predictions for the mid- and long-term are for a tighter and less secure international market that will put upward pressure on prices. Prices of natural gas and electricity are expected to increase steadily over the next few years as a result of decontrol and the inclusion of the capital costs of new plant construction in the rate bases of utilities.

New creative financing methods have begun to take advantage of the unique money-saving nature of energy conservation. Colleges and universities no longer have to delay energy efficiency projects because of lack of funding. Energy efficiencies can now be captured without cutting into other programs or incurring additional overall costs. Alternative financing techniques generate an immediate, positive cash flow and allow campuses to implement conservation despite fiscal constraints.

The main principle behind these financing techniques is straightforward: energy conservation saves money, and the savings can be used to pay the cost of improvements. Economically sound projects can be self-financing and offer compelling opportunities for cost reduction.

Choosing the Right Financing Option

Each financing option is suited to a particular situation. Dictating which option is best are the size and type of the energy project as well as the institution's financial status (i.e., its debt capacity and credit worthiness, its level of in-house energy expertise, its approach toward the risks associated with energy projects, its resources available for investing in projects, and whether it is public or independent). A summary of the financial options appears in Exhibit 1 on page 26.

The first consideration is project size. An energy efficiency program will consist of a range of many small projects as well as several major

This article is one of eight papers in the Energy Task Force series on "Financing Campus Energy Conservation Projects." In addition to Financial Planning for Energy Efficiency Investments, Business Officer will publish in the coming months State Policy Initiatives for Financing Energy Efficiency in Public Buildings and Shared Savings Financing of College and University Energy Efficiency Projects.

To obtain a list of all the papers available and to receive additional information on the project, write to the Energy Task Force, 11 Dupont Circle, Suite 250, Washington, D.C. 20036. The task force is composed of NACUBO, the Association of Physical Plant Administrators of Universities and Colleges, and the American Council on Education.

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Exhibit 1: Summary of Financing Options

1. Internal Financing
   Public: Yes
   Independent: Yes
   Recommended applications: Normal capital budget is usually insufficient to fund all cost-effective projects. Use limited internal funds first for energy O&M program, audits, feasibility studies, and small, short-payback projects.

2. Building Reserve & Replacement Funds
   Public: Yes
   Independent: Yes
   Recommended applications: Funds are limited and special purpose. First, determine what funds are available. Use building reserve funds for small, short-payback measures and energy project feasibility studies.

3. Bond Fund Pools
   Public: Yes (possible through public revenue bonds)
   Independent: Yes (organized by educational facilities authorities)
   Recommended applications: Will finance projects $25,000 through $1 million, and greater. Interest rates: 8–10%. Terms: 5–10 years. Can fund all types of projects. Uses institution's borrowing capacity; financing must be secured. Requires organizing of campuses statewide.

4. Shared Savings
   Public: Yes (if procurement and contracting laws allow)
   Independent: Yes
   Recommended applications: Will fund all types of projects, preferably equipment with a simple payback of 2.5 years and less. Larger projects attract more investor interest. Shared savings firm provides financing and energy management services, assumes project risks, and guarantees positive cash flow.

5. Municipal Leasing
   Public: Yes (widespread applicability)
   Independent: No (use private placements or bond fund pool instead)
   Recommended applications: Use for projects $100,000 and up (to several million). Interest rates: 9–12%. Terms: 5–10 years for conservation projects, 15–20 years for central plant projects. Very flexible. Can fund all types of projects. Projects can be pooled in one transaction.

6. Third-Party Project Financing
   Public: Yes
   Independent: Yes
   Recommended applications: Use this method for cogeneration, fuel conversion, and major central plant projects of $500,000 and up.

7. Fund Raising
   Public: Yes
   Independent: Yes
   Recommended applications: Incorporate energy project capital needs in development campaigns. Market financial instruments (e.g., bonds, lease interests) to alumni.

8. Tax-Exempt Bonds
   Public: Yes
   Independent: Yes
   Recommended applications: Full bond issue requires minimum project size of approximately $2–3 million. Smaller projects can be financed with privately placed tax-exempt debt. Uses borrowing capacity; financing must be secured.

9. Commercial Bank Borrowing
   Public: No
   Independent: Yes
   Recommended applications: Interim and construction financing. Interest rates are taxable (prime plus).

10. Borrowing from Endowment
    Public: Yes
    Independent: Yes
    Recommended applications: Unrestricted endowment can be used as a revolving loan fund for energy projects that have a higher ROI than the endowment. Best suited for smaller project packages (less than $100,000) with short paybacks.

ones. External financing, as opposed to drawing from the campus budget, is more feasible, flexible, and easier to arrange for larger projects or packages of projects.

However, to package many small projects together can delay their implementation. Using some readily available source of funds—such as internal funds, loans from endowment, bank borrowing, or building reserve funds—to implement the small, quick-payback projects that have already been identified on campus can be the basis for starting or enhancing an energy management program. Institutions that are planning the long-term bond funding of a large nonenergy project in the future can also include funding for several small energy projects within the same issue.

Money for the upfront cost of energy development—for audits, engineering, staff time, or contract documents—can be secured from the same sources. The first cost of development is for information: What is the saving potential of the campus? What projects are available? How much will they cost and how much will they save? Assembling information and acquiring engineering studies will require some investment of time and dollars. Many audits have been paid for by federal grants. The quality of these audits varies widely, thus additional work may be required. Campuses should be willing to spend up to several thousand dollars for the energy studies necessary to launch a comprehensive energy program. The amount of savings that can result warrants the investment.

There are several other practical funding strategies to meet these costs: (1) use energy savings from operations and maintenance (O&M) improvements to fund project identification and development; (2) use *building reserve and replacement funds*; (3) borrow short-term and refinance when the project is ready to be implemented; and (4) use a financing option that incorporates these soft costs into the long-term financing. This last option for financing soft costs points up a critical choice that campus administrators must make: whether to tie in needed energy management services with project financing or to elect a straight financing option.

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Assessing Internal Skills

Certain funding options provide technical assistance along with money. At the outset of an efficiency program, a physical plant manager must assess what skills the program will require and what skills his or her staff can reasonably provide. The gap between the two can be filled by contracting with energy service companies. These companies will provide funding as well as services through *shared savings contracts* and *third-party project financing*. Or, contracted energy management services can be combined with a straight financing mechanism.

Assumption of risk is another service that energy firms or insurance companies can be hired to provide. If a project fails to provide the savings expected under a shared savings contract or third-party financing, the firm rather than the institution bears the expense. In addition, insurance can be purchased to guarantee the estimated savings whether a shared savings plan is used or not.

If a college or university chooses a straight financing option, it should always take advantage of tax-exempt debt. As nonprofit institutions, colleges and universities—both public and independent—have access to such financing.

Straight Project Funding for Publics

One of the most flexible financing options for public institutions is *municipal leasing*, also known as a tax-exempt lease purchase. A municipal lease functions as a straight loan at tax-exempt interest rates and can finance any type of equipment or project. The minimum project size required for municipal lease financing is approximately $100,000. Several projects can be pooled in one lease transaction, which can be structured to generate immediate, positive cash flow.

Tax-exempt bonds, both revenue and general obligation, can also be used for financing projects at public institutions. Because debt capacity is a limited resource, public institutions may want to conserve it for other purposes. Individual institutions generally can issue their own tax-exempt debt for auxiliary enterprises such as dormitories. Financing projects for general academic and research facilities will require the initiative of state legislators and executive agencies to issue and administer the bonds. Creative fund raising and loans from endowment can also provide straight financing for public institutions.

Straight Financing For Independents

There are several straight financing possibilities for independent institutions. Many states have established educational facilities authorities that can issue tax-exempt debt. A small institution can circumvent the $2 million minimum on bond issues by participating in a *bond fund pool*. Or the campus can seek to place tax-exempt debt privately with one investor, thus reducing the transaction costs of a bond issue and allowing debt to be issued in smaller amounts. Campuses can also seek vendor financing of conservation equipment.

"The main principle behind these financing techniques is straightforward: energy conservation saves money, and the savings can be used to pay the cost of improvements. Economically sound projects can be self-financing and offer compelling opportunities for cost reduction."

Reevaluating Capital Budgeting

All types of energy projects can be financed if they are cost effective. Two barriers exist, however, to the exploitation of these new financing options: (1) lack of understanding of the options and of how an energy project can be presented not as a budget expenditure but as an energy efficiency investment (EEI); and (2) the rigidness of the normal capital budgeting procedure that ignores the savings aspect of energy efficiency projects.

The normal capital budgeting procedure can inhibit the timely and cost-effective development of energy savings potential. Energy efficiency projects are usually initiated by the physical plant department of an institution and can subsequently be lost among other capital budget requests. A capital ceiling is implied or imposed and ignores the self-financing aspect of EEIs. Thus energy projects *a priori* are eligible for a limited amount of funds, even before their savings potential and financing options are thoroughly assessed. The normal capital budgeting procedure can be summarized as follows:

1. A capital ceiling is established or understood.
2. All capital projects are assembled and ranked by priority (the criteria for ranking are primarily nonfinancial).
3. Priority projects are negotiated and matched with limited available funds.

Because they save money over time, energy efficiency investments should not be made to compete for the same scarce funds as other campus priorities. Energy projects should be presented separately for capital budgeting and evaluated solely on a return-on-investment (ROI) basis.

Even where energy projects are evaluated on a financial basis, capital budgeting criteria remain shortsighted. In many public institutions, the investment threshhold for energy projects is a payback of 1.5 years, leaving large amounts of capital improvements unfunded. With alternative financing, the savings potential of these projects can be realized by financing and implementing these projects on a positive cash-flow basis.

Establishing an Internal Policy

Institutions can encourage energy project development by adopting a decision-making framework or internal policy. The suggested policy on capital budgeting for energy projects lifts the capital ceiling, evaluates projects on the basis of their financial returns, and funds all cost-effective projects through alterna-

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tive financing. The policy recommends that campuses:

1. Provide resources for assessing campus energy savings potential and performing preliminary project feasibility studies.

2. Commit themselves to the funding of all energy efficiency projects that are cost effective. A project is defined as cost effective if it meets the ROI "hurdle" rate (see below) and if it can be financed on a positive cash-flow basis (i.e., energy savings are greater than finance payments).

3. Identify the best available financing options and develop procedures for their use.

An institution's financing policy needs to be communicated clearly to the officers in energy and physical plant management. The assumed capital ceiling needs to be lifted and the energy management team instructed to identify improvements that meet the new financing criteria and policy. In a state or public institution, those responsible for finance and energy can include state system managers, budget and general services officers, and ultimately the legislature. At an independent institution, the policy should be communicated by the business officer to the physical plant director and energy manager. If necessary, a commitment in principle by the Board of Trustees to this policy can be sought. Otherwise, board approval can be obtained for specific project financings using the positive cash-flow logic.

Establish a target rate of return. Most industries have a "target" or "hurdle" rate of return for new capital investment. ROI or the Simple Payback Period (SPP) measure may be used to specify the target rate. Any project with an ROI greater than or an SPP less than the target rate will be implemented.

The target rate may be different for larger scale projects with long economic life, just as short-term and long-term interest rates are different. Also, the target rate can vary with specific projects depending on the associated risks. Any project with an SPP of one year or less should be implemented as soon as possible. No other financial analysis is needed. Institutions may want to adopt a policy of financing such projects from current funds in order to speed their implementation and begin accruing savings immediately.

The target rate may be based on the ROI from endowment investments plus some additional premium for risk transaction costs. The target rate is also used as the "minimum acceptable rate of return" (MARR) when calculating the net present value of energy investments. Establishing a target rate will help institutions to think of energy efficiency projects as investments and to compare them with other investment opportunities.

Risk Management

As with any investment, the risks of EEIs need to be understood and faced directly. A strategy can then be devised.

Price risk. Future energy prices are uncertain. Therefore, the amount of savings that an EEI will generate is also unknown. Although future prices cannot be controlled, the risk can be tested and managed. For major energy projects, a sensitivity analysis should be performed, testing the ROI's in light of different price forecasts. If a project is still attractive, then it should be implemented. Also, savings are partly a function of the weather, which is clearly uncontrollable.

Technical risk. Technical risk has several dimensions. First, there is the technical uncertainty in the engineering estimates of energy savings. The energy efficiency industry has matured enough in recent years to build up a large body of case studies and experience with successful efficiency measures. The estimates of energy savings are becoming more accurate and reliable. This technical uncertainty can be circumvented by using a qualified engineer. Further, a second opinion can be obtained on the project feasibility study.

The second technical risk is in the performance of installed equipment. If equipment is faulty or is frequently down, savings will not be achieved as expected. The risk of poor equipment performance must be addressed with the contractor or vendor. Warranties, guarantees, service contracts, and performance bonds can be arranged to assure vendor/contractor responsibility for equipment performance.

Another aspect of technical risk is that equipment performance and thus energy savings are often dependent on human operation of equipment. A control system is a perfect example. It is a tool that must be used properly for its benefits to be gained. Training of personnel to operate the system should be included in the original purchase.

A sound energy efficiency project anticipates these risks and develops quality control and management strategy to deal with them.

The chief risk management tools are:

1. Sensitivity analysis (explained below).

2. Engineering review.

3. Careful procurement and contracting.

4. Operations and maintenance (O&M) planning.

Another strategy is to have private businesses assume the risks. There are many forms and potential arrangements, including shared savings and energy service performance contracting, service contracts for equipment operations and maintenance, and insurance and guarantees on engineering and equipment performance. With the existence of these services, an administration can choose how much risk it wants to assume in the course of achieving energy efficiency.

Integrating the Capital Program with O&M

Energy savings come from two sources: O&M improvements and capital improvements. For several reasons development of a sound energy data base, comprehensive energy audits, and an O&M program must precede the capital program. First, capital projects must be identified and engineered. A complete inventory of available energy savings measures should be compiled so that they can be implemented in priority order. Too often an institution's first energy conservation expenditures have been made on projects with relatively low energy savings—for example, storm windows—when other more cost-effective projects remain unidentified.

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Second, the knowledge gained about a building's energy systems and use patterns during development of a building energy data base and an O&M program will help assure that the capital projects are well conceived and are operating efficiently.

Third, the savings resulting from some types of improvements, for example, a computer control system, are dependent on successful operation. The training of plant personnel in energy systems O&M is critical in order to receive the full value of the capital program.

Finally, O&M improvements are the quickest and cheapest way to begin saving energy. Success here validates the program, and the savings achieved can also be used to develop further capital improvements. Savings from major capital projects should be estimated based on energy loads and use patterns; otherwise they may be overstated or the savings may not be achieved in the least expensive manner. For example, if demand for steam can be reduced through improved classroom scheduling and better maintenance of steam traps and air filters, then the estimated savings from a boiler conversion project (e.g., from oil to coal) will be lower because of reduced fuel consumption. This change could affect the optimal size of the new boiler system or the decision to go ahead with the conversion project. Financing capital improvements must always be integrated with the institution's overall energy management program so that premature capital spending can be avoided.

Financial Evaluation of Efficiency Investments

By restructuring the institution's approach to energy efficiency investments, the way is paved for evaluating projects from a financial point of view.

Such evaluation of EEI's is a two-step process: (1) deciding what projects to implement, and (2) determining the best method of financing. Each investment needs to be analyzed on its own merits. The standard measures of financial analysis are SPP, NPV (net present value), and ROI.

For many colleges the key factor influencing the decision to implement an EEI is not its economic merits but its effect on the institution's cash flow. Even if the project represents an attractive investment, it may not be implemented, as many business officers are conserving their cash to maintain financial flexibility. As explained above, however, creative financing can allow an institution to implement a project without tying up campus funds. The cash-flow effect from implementing an EEI can be calculated after determination of the means of financing.

No amount of creative financing will make up for an uneconomical energy project. However, creative financing based on the principle of generating an immediate positive cash flow can allow all colleges to take advantage of cost-effective energy-saving opportunities.

Simple payback period. SPP indicates the number of years it takes for the efficiency investment to return its initial costs in the form of savings. It is the simple ratio of costs to first-year savings.

Net present value. NPV is the value of future energy savings discounted to present value, less all project construction and operating costs. This measure takes into account the "time value of money" and any anticipated changes in energy prices. The discount rate used to calculate the present value of future energy savings is the MARR of the institution. To make the NPV analysis more conservative, the discount rate can be increased. To calculate the net present value, all future cash flows, expenses, and savings related to the project need to be estimated, including additional expenditures necessary to operate and maintain the new installation. If the NPV for a proposed project is positive, the project should be implemented. The term of analysis is usually the economic life of the project, but it can be shortened to make the results more conservative.

Return on investment. The ROI of a project is the discount rate that, when used to discount all present and future costs and savings from a project, brings the NPV to zero. Increasing the discount rate will reduce the NPV. The ROI is calculated by a trial and error process whereby different discount rates are tested until the one that reduces the NPV to zero is derived (the ROI of a project can be compared to returns from other investments). The project should be implemented if it offers an ROI comparable to other investment opportunities with equal levels of risk. The term "cost effective" refers to investments that meet the NPV and ROI criteria.

Cash-flow improvements. The projected annual net effect (positive or negative) on an institution's cash flow from implementing a project is the critical measure and is dependent not only on the project's economic merits but also on how it is financed. Properly financed, an efficiency investment can generate an immediate positive cash-flow improvement for the institution.

The sample cash-flow chart (Exhibit 2) below illustrates these principles.

Column 1 represents annual energy costs if no improvements are made. These costs are escalated at an annual rate to reflect increasing energy costs. The previous year's energy consumption and cost are used as the base. Here, the energy price

Exhibit 2: Hypothetical Cash-Flow Chart

Year	(1) Energy Costs (before)	(2) Energy Costs (after)	(3) Energy Savings	(4) O&M	(5) Debt Service	(6) Net Savings	(7) Present Value	(8) Cum. Present Value
82/83	$1,000,000	$ 850,000	$150,000	$22,500	$124,840	$ 2,660	$ 2,313	$ 2,313
83/84	1,080,000	918,000	162,000	23,625	124,840	13,535	10,234	12,547
84/85	1,166,400	991,440	174,960	24,806	124,840	25,314	16,644	29,191
85/86	1,259,712	1,070,756	188,957	26,047	124,840	38,070	21,767	50,958
86/87	1,360,489	1,156,416	204,073	27,349	124,840	51,884	25,796	76,754
87/88	1,469,328	1,248,929	220,399	28,716	0	191,683	82,870	159,624
88/89	1,542,795	1,311,375	231,419	30,152	0	201,267	75,664	235,288
89/90	1,619,934	1,376,944	242,990	31,660	0	211,330	69,084	304,372
90/91	1,700,931	1,445,791	255,140	33,243	0	221,897	63,077	367,449
91/92	1,785,978	1,518,081	267,897	34,905	0	232,992	57,592	425,041
					TOTAL SAVINGS	$1,190,632		

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escalation rate is 8 percent for the first five years and 5 percent annually thereafter. A more refined analysis could vary the price escalation rates in different years and for different energy types. All figures are nominal dollars uncorrected for inflation.

Column 2 represents annual energy costs after the improvements are made. Here, a $450,000 investment has base-year savings estimated at $150,000, with a three-year payback. The year 1/Column 2 figure equals the Column 1 figure minus the savings estimated from the improvements. This figure is then escalated using the same energy price increase rate as in Column 1.

Column 3 represents the energy savings resulting from the project (i.e., Column 1 minus Column 2). Column 4 represents the additional O&M costs associated with the improvements—5 percent of the initial capital costs of the project. This cost is escalated at 5 percent (the anticipated inflation rate). This implies that energy prices are expected to increase at a rate 3 percent above the general inflation rate.

Column 5 represents the debt service payments for the energy improvements. The critical factors are the term of the financing and the interest rate. In the exhibit a five-year, 12 percent financing rate is used. Levelized debt service is assumed. If the improvements are paid for out of current funds, this one-time payment is registered in year 1.

Column 6 is the annual net savings or cash-flow improvement resulting from the project. It equals the amount in Column 2 minus the amounts in Columns 3 and 4.

Column 7 is the present value of each year's net savings. Column 8 is the cumulative present value. A 15 percent discount rate is used to calculate the present value, representing a typical institution's MARR on such investments.

Working with the Financial Analysis

The key variables for the financial analysis are:

- Term of analysis
- Energy price escalation factor
- Base-year savings
- Project costs
- Additional O&M costs
- Term of financing
- Interest rate on financing
- Discount rate or MARR.

A high level of sophistication in financial analysis is not necessary for smaller projects with quick paybacks. Their returns are so assured and rapid that the decision to implement them does not require a lot of study. However, the financial analysis of any major investment should be tested for its sensitivity to changes in the variables listed above. The following points regarding these variables should be kept in mind when performing or reviewing financial analyses.

"Because they save money over time, energy efficiency investments should not be made to compete for the same scarce funds as other campus priorities. Energy projects should be presented separately for capital budgeting and evaluated solely on a return-on-investment basis."

Term. The term of analysis is usually the economic life of the project. Except for major projects, or for new construction, 10 years is an adequate period of analysis. Analyses that require long time-horizons to justify projects involve greater uncertainty.

Price. The energy price escalation factor should always be scrutinized closely and confirmed with research on local utility and fuel costs. Escalation factors will vary by energy type, and this should be included in the analysis (i.e., the project under consideration should have estimates of energy savings broken out by fuel type).

Price increases are also uneven. Decontrol will raise gas prices by 30 percent per year through 1986, whereafter the price will roughly follow that of oil. Electricity price increases are also uneven. Thus, a straight escalation rate may not accurately reflect expectations in the near term. Be wary of analyses that depend on high, consistent price increases over a long period to show favorable returns. Double-check the reasonableness of price escalation assumptions by calculating the effective per unit energy price at the end of the projection period. For example, if electricity costs currently average 5 cents per kwh and are projected to increase 12 percent per year for 10 years, then the price at the end of the projection period is 15.5 cents per kwh. If this does not seem reasonable, the projection should be revised.

Operations & Maintenance. The O&M costs of some improvements can be significant. Obtain an estimate of those costs from the engineering contractor. As a rule of thumb, 5 to 8 percent of original capital costs is usually the case.

Financing. The term and the rate of the financing will affect cash flow. Longer terms and shorter rates will improve the cash flow more in the initial period. The term of the financing should not be greater than a conservative estimate of a project's useful life. Most financing options fit easily into the cash-flow model above, and most financing arrangements call for level debt service. Variations on this standard must be included in the model.

Savings. Actual energy savings from implementing a package of projects may be less than the sum of the individual project estimates of energy savings. Duplication in the savings estimate needs to be eliminated. For example, implementation of a steam-line insulation and a boiler conversion should be considered first as two separate projects and then as one package. If the boiler is converted to a cheaper fuel, the amount of the energy cost savings will depend on the total energy use times the difference in fuel prices. If the steam lines are insulated, then heat loss and total steam demand will be reduced, thus also reducing the effective savings from the boiler conversion.

Cost of delay. Finally, the speed with which a project is implemented is important. Savings do not begin until the project has been com-

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pleted. Delay means losing potential savings. When comparing financing options, administrators should factor into the NPV analysis the speed with which financing can be arranged and the date on which construction can begin. All else being equal, the option that expedites implementation is favored.

Energy Financing Self-Assessment Questions

The last step toward energy efficiency is the application of the theories and principles. By answering the following self-assessment questions, administrators will begin to develop an institutional policy for financing energy efficiency.

1. What is the normal capital budgeting procedure? What is the process by which capital projects are initiated, screened, compiled, and approved? Which offices are involved in the decision making? How long does it take for appropriations to become available?

2. Have any energy projects been identified that have not been submitted for funding? What is their estimated cost? What are the estimated savings? Is there a chance that cost-effective projects will not be funded because of limited resources? Has this occurred in the past?

3. What levels of risk—in terms of engineering estimates, equipment performance, energy price changes—can be assumed in developing the energy efficiency potential of the campus? Are there guarantees of energy savings or other arrangements whereby private firms assume risk?

4. What is the target rate of return or the payback period for energy efficiency investments? Does this rate change with the size of the projects?

5. What is the rate of return achieved by endowment investments (including both current yield and appreciation)? What policies govern use of the endowment? Are there any restrictions that would disallow use of the endowment (as a source of direct investment funds or as collateral) for financing campus energy efficiency investments if an attractive ROI can be achieved?

6. What is the "worst case" estimate for future energy price increases in the area? What is a conservative estimate? How much can the institution expect to be paying for energy needs, given the current level of efficiency?

7. What dollar resources are available to meet upfront project costs? Is the immediate positive cash flow criterion for choosing what projects to implement more important than the NPV and ROI measures?

8. Are there any available building reserve funds? What are the restrictions on their use? What is the nature of the fund in terms of debt service, emergency repair, and maintenance? Who administers these monies? Can they be used to finance the "soft" costs of developing energy projects? When is this debt retired? What happens to the revenue and replacement fund on retirement?

9. What in-house engineering, energy conservation, and project management staff resources are available? What types of plant services and skills are currently subcontracted (e.g., electric, HVAC, equipment service contracts, food service)?

10. What assets or revenue streams can be offered to secure energy project financing?

11. How are energy costs currently accounted for?

12. What financing options appear to be available and most attractive? What legal/institutional barriers exist to their use? What is the institutional procedure by which these options would be used? What is the procurement procedure for major projects? What is the procedure for hiring consultants?

Portfolio Articles

Views expressed in Portfolio *articles are those of the authors; publication in* Business Officer *does not signify acceptance or endorsement by NACUBO. Manuscripts for* Portfolio *are invited and should be sent to the Editor,* Business Officer, *NACUBO, One Dupont Circle, Suite 510, Washington, D.C. 20036-1178. Manuscripts should be typed, double-spaced, and ideally be between 6 and 16 pages long. All manuscripts will be considered, however.*

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